From

Director,
Fire Service, Haryana,
Panchkula.

To

M/s Ansal Properties & Infrastructure Pvt. Ltd.
C/o M/s JMD Ltd.,
JMD Regent Square, 3rd Floor, MG Road,
Gurugram.

Memo No. DFS/F.A./2017/706/ 50061
Dated: 15-6-17

Subject: **Approval of fire fighting scheme from the fire safety point of view of the Commercial Colony namely "Suburbio 67" meas. 4.237 acres at Sector- 67, Gurugram of M/s Ansal Properties & Infrastructure Pvt. Ltd. C/o M/s JMD Ltd.**

Reference to your CFC No. 201703115476 dated 11.03.2017 on the subject cited above.

Your case for the approval of fire fighting scheme has been examined as recommended by the Sr. Fire Station Officer, Gurugram. The Fire fighting scheme is found as per the N.B.C. 1983 Part IV revised 2005/ guidelines. Therefore, your proposed fire fighting scheme is hereby approved from the fire safety point of view with the following conditions:-

1) The proposed fire fighting scheme is approved as submitted in the building plan subject to the approval of building plan by the competent authority.
2) The approval of fire scheme by this office doesn't absolve the firm from his responsibility from all consequences, in case of fire due to any deficiencies or anything left out in the scheme submitted by you.
3) Overhead & underground water tanks provided for firefighting shall be so constructed in such a way that the domestic water tank shall filled from overflow of the fire Water tanks.
4) As soon as the installations of fire fighting arrangements are completed, the same may be got inspected/ tested and clearance should be obtained from this office.
5) If the infringement of Byelaws remains un- noticed the Authority reserves the right to amend the Plans/Fire Fighting Scheme as and when any such infringement comes to notice after giving an opportunity of being heard and the Authority shall stand Indemnified against any claim on this account.
6) If you fail to comply with any of the above terms & conditions you will be liable to be punished as per Chapter-III Section 31 Sub-Section 1 & 2 of Fire Act 2009 i.e. imprisonment for a term which may extend to three month or fine which may extend to five thousand rupees or both.
7) The staircase shall be made with the specified material enabling it non-slippery.
8) If the gap between ceiling and false ceiling is more than 800 mm then upright sprinkler and detectors above false ceiling & pendent sprinkler below false ceiling shall be installed in the building.

15/6/17
Fire Officer (HQ)
for Director, Haryana Fire Service,
Panchkula.

Endst. No- DFS/F.A./2017/706/ Dated:

A copy is forwarded to the Sr. Fire Station Officer, Gurugram with reference to his Memo No. MCG/FS/SFSO/2017/947, dated 28.03.2017 for information and necessary action.

Sd/-
Fire Officer (HQ)
for Director, Haryana Fire Service.

1. ELECTRICAL LOAD

S. No.	Description	Connected Load (kW)	Diversity Factor	Demand Load (kW)
1.	Basement Lighting & Power (156009 sq ft @ 0.3 W/ s ft)	47	0.8	38
2.	Common Area Lighting & Power	80	0.8	64
3.	Office Lighting & Convenience Power @ 3.5 Watt/s w/out AC	0		0
3.1	101 No. Office up to 300 s ft @ 1 kW each	101	0.8	81
3.2	47 No. Office 301 to 400 s ft @ 1.5 kW each	71	0.8	57
3.3	17 No. Office up to 500 s ft @ 1.75 kW each	30	0.8	24
3.4	8 No. Office up to 700 s ft @ 2.5 kW)	20	0.8	16
4.	Lighting & Power Load for shops @ 5 W / s ft w/out AC	0		0
4.1	52 No. Shops up to 200 s ft @ 1 kW each	52	0.8	42
4.2	26 No. Shops up to 300 s ft @ 1.5 kW each	39	0.8	32
4.3	73 No. Shops up to 400 s ft @ 2 kW each	146	0.8	117
4.4	27 No. Shops up to 500 s ft @ 2.5 kW each	68	0.8	54
4.5	1 No. Shops up to 900 s ft @ 4.5 kW each	4.5	0.8	4
4.6	2 No. Shops up to 1000 s ft @ 5 kW each	10	0.8	8
4.7	1 No. Shops up to 1260 s ft @ 6 kW each	6	0.8	5
4.8	1 No. Shops up to 1400 s ft @ 7 kW each	7	0.8	6
4.9	2 No. Anchor (4000 s ft @ 20 kW)	40	0.8	32
5.	135 Bays Suits @ 3 kW	405	0.4	162
6.	Elevator (6 No. @ 20 kW each)	120	0.9	108
7.	External & Landscape Lighting & signage	50	0.7	35
8.	HVAC Load	1424	0.8	1339
9.	Ventilation Load (Normal)	260	0.6	156
10.	Plumbing Load	162	0.6	97

FOR ANSAL PPI

AUTHORISED SIGNATORY

For JMD Limited

Authorised Signatory

S. No.	Description	Connected Load (kW)	Diversity Factor	Demand Load (kW)
11.	Fire Fighting Load	100	-	0
12.	Jocky Pump	22	0.8	18
	Total	3138		2495
	Overall load Factor @ 0.9 in kW			2246
	Considering Power Factor of 0.9 in kVA			2495
	Transformer Selected (Considering 85% Loading)	**2 No. 1600 kVA each**		
	CT Pump, Cooling Tower Fan and ventilation			100
	Total			2346
	Considering Power Factor of 0.8 in kVA			2933
	G Selected (Considering 85% Loading)	**2 No.1500 kVA+ 1No. 500 kVA**		

FOR ANSAL APL

AUTHORISED SIGNATORY

For JMC Projects (India) Ltd.

Authorised Signatory

FIRE PUMP HEAD CALCULATIONS

Fire Hydrant Pump Head Calculation

Frictional head loss

Diameter of External Ring main	-	150 mm dia
Diameter of Wet Riser Pipe	-	150 mm dia

Valves & Fittings

As per Table No. 29 on page no. 100 of Sprinkler TAC

For 150 mm dia Pipe (External)

	Welded Elbow 90° considered	-	6 Nos.	
	Equivalent Length of 1 Elbow	-	2.64 M	
=>	Equivalent Length for 6 Elbows	-	6 x 2.64	
		-	15.84M	i)
	Other Fittings considered	-	4 Nos.	
	Equivalent Length of 1 Fitting	-	11.34 M	
=>	Equivalent Length for 4 Fitting	-	4 x 11.34	
		-	46.36M	-ii)
	Non Return valve considered	-	1 Nos.	
	Equivalent Length of 1 Valve	-	9.4 M	-iii)
	Butterfly Valve considered	-	4 Nos.	
	Equivalent Length of 1 Valve	-	8.62 M	
=>	Equivalent Length for 5 Valve	-	4 x 8.62	
		-	34.48 M	-iv)
	Hence, Equivalent length of All Valves & Fitting of 200 mm pipe	-	i + ii + iii + iv.	
		-	15.84+46.36+9.4+34.48	
		-	**106.08 M**	**-A)**

Length of 150mm dia pipe upto farthest hydrant point	-	200.00 M
Equivalent Length of Valves & Fittings	-	106.08 M
Total length of 150mm dia pipe	-	306.08 M

For ACROBAT ENGINEERS PVT. LTD.

NAVIN KUMAR
B. Arch
CA/2003/31873, AIIA/A-1497

As per Hazen William's Chart for the flow of 2850 LPM (47.5 LPS)
Head loss per 1000 M is 40 M
Hence, for a length of 306.08 M head loss is - 40 x 0.306
- 12.24 M - B)

For 150 mm dia Pipe (Wet Riser)

Length of 150mm dia Wet Riser Pipe - 38.4 M

i) Welded Elbow 90° considered - 2 Nos.
Equivalent Length of 1 Elbow - 2.00 M
=> Equivalent Length for 4 Elbows - 2 x 2.00
- 4.00 M - I)

Total length of 150mm dia pipe - 38.4 + 4.0
= 42.4 M

Considering a flow of 11 LPS per hydrant point;
For 3 no. of hydrant points flow in 150mm dia. branch pipe is 33 LPS
As per Hazen William's Chart for the flow of 1980 LPM (33 LPS)
Head loss per 1000 M is 50.0 M
Hence, for a length of 42.5 M head loss is - 42.4 x 0.05
= **2.12 M - C)**

Hence, Total Head Loss is - B + C
12.24 + 2.12
= **14.36 M**

Required Minimum Pressure at last hydrant (As per TAC) - 35.0 M
Height of the Internal Hydrant - 38.4 M
Frictional head loss = 14.36 M
Total = 87.76

Hence, Pump Head Selected is 88M

For MD Limited

Authorised Signatory

ACROBAT ENGINEERS PVT. LTD.

NAVIN KUMAR
Director
DIN/2003/31878, AITA/A-1464

Sprinkler Pump Head Calculation

Last row of 4 sprinklers at Fifth Floor between 3 lifts has been considered as the remote group of sprinklers.

Pipes past Installation Control Valve (ICV)

i)	Length of 65mm dia pipe	=	4.70 M
	Add 10% for fittings and valve	=	1.61 M
	Total length of 65 mm dia pipe	=	5.17M
ii)	Length of 80 mm dia pipe	=	12.20 M
	Add 10% for fittings and valve	=	1.61 M
	Total length of 65 mm dia pipe	=	13.42M
iii)	Length of 100 mm dia pipe	=	13.0 M
	Add 10% for fittings and valve	=	1.61 M
	Total length of 100 mm dia pipe	=	14.30M
iv)	Length of 150 mm dia pipe	=	5.0 M
	Add 10% for fittings and valve	=	0.5 M
	Total length of 150 mm dia pipe	=	5.5 M

Pressure loss in pipes past ICV in Ordinary Hazard installation shall be considered as per Table
21 on page no. 80 of TAC.

Hence,

Pressure Loss in 65mm dia pipe = $5.17 \times \frac{35 \text{ bar}}{1000}$

= 0.18 bar

or = **0.18 M head - a)**

Pressure Loss in 80mm dia pipe = $13.42 \times \frac{16 \text{ bar}}{1000}$

= 0.21 bar

or = **0.21 M head - b)**

Pressure Loss in 100mm dia pipe = $14.30 \times \frac{4.4 \text{ bar}}{1000}$

= 0.06 bar

or = **0.06 M head - c)**

For JMD Limited

Authorised Signatory

ACROBAT ENGINEERS PVT. LTD.

Pressure Loss in 150mm dia pipe = $5.5 \times \frac{0.65 \text{ bar}}{1000}$

= 0.003 bar

or = **0.03 M head - d)**

Total head loss in pipes past ICV, P_{ICV-p} = a + b + c + d

= 0.18 + 0.21 + 0.06 + 0.03

= **0.48M head - e)**

Installation Control Valve

As per clause no. 8.2.2 on page no. 33 of TAC, pressure required at ICV is

P_{ICV} = 2.0 bar + Height of highest sprinkler from ICV
= 20 + 38.4

P_{ICV} = **44.4 M head - II)**

Pressure loss in Fire pump room in header
Valves etc. (common to sprinkler and Fire hydrant, P_{PR} - **15 M head III)**
Minimum Pressure required at last Sprinkler, P_S - **5.0 M head IV)**

Total Head loss in the pipes P = $P_{ICV-p} + P_{ICV} + P_{PR} + P_S$

= 0.48 + 58.4 + 15 + 5

= **78.88 M head**

Hence, the Sprinkler Pump head selected is 88 M

For JAIB Engineers
Authorised Signatory

ACROBAT ENGINEERS PVT. LTD.

NAVIN KUMAR
B. Tech
G.I.2003/31878, AIIA/A-1458

JMD SUBURBIO AT SECTOR-67, GURGAON

WATER CURTAIN SYSTEM TECHNICAL DETAILS

Date - 17/ 12/2016

S. No.	System/ Component	Detail
1	Type of Pipe	MS Class C
2	Diameter of Pipe	150 mm dia Feeder Main 100 & 80 mm dia Distribution Piping
3	Nozzle Type	Water Curtain Nozzle
4	MOC	Brass
5	Size	1/2" - 15 mm
6	K Factor	K 60
7	Spacing	2.0 - 2.5 M C/C
8	Operation	Motorized Valve with FAP signal operation from flow switch
9	Pressure at Nozzle	2.0 Bar
10	Flow @ Nozzle	84.8 LPM
11	Maximum operating Nozzle in a Zone	29. Nos.
12	Pump Type	Electrical - Vertical Centrifugal
13	Pump flow C for Nozzle @ B1	2459 LPM - 40.98 LPS
14	Pump Head	35 M (Approximately)
15	Proposed Pump	2500 LPM @ 35 M Head

For JMD Limited

Authorised Signatory

NAVIN KUMAR
Branch
CC-1200/5162, AIIA/A-1454

ACROBAT ENGINEERS Pvt. Ltd.
PROJECT: JMD Suburbio-1

S.No.	Description	Area (Sqft)	Height (ft)	Ventilation Rate (ACPH)	Air Quantity (CFM)	Exhause Air System			Supply Air System		
						Ex. Fan (CFM)	Type	Fan Qty. (Nos.)	Sup. Fan (CFM)	Type of Fan	Fan Quantity (Nos.)
I	**LOWER BASEMENT**										
	ZONE-1										
1	Car Parking (Ventilation)	29364	12	12	70474	24000	Axial Flow	3	24000	Axial Flow	3
	ZONE-2										
2	Car Parking (Ventilation)	29364	12	12	70474	24000	Axial Flow	3	24000	Axial Flow	3
	ZONE-3										
3	Car Parking (Ventilation)	29364	12	12	70474	24000	Axial Flow	3	24000	Axial Flow	3
I	**UPPER BASEMENT**										
	ZONE-1										
1	Car Parking (Ventilation)	29030	12	12	69672	24000	Axial Flow	3	21500	Axial Flow	2
	ZONE-2										
2	Car Parking (Ventilation)	29030	12	12	69672	24000	Axial Flow	3	21500	Axial Flow	2
	ZONE-3										
3	Car Parking (Ventilation)	29030	12	12	69672	24000	Axial Flow	3	21500	Axial Flow	2

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NAVIN KUMAR

		PROJECT: SUBURBIO-I					
		SMOKE EXTRACTION AIR CALCULATION					
S.NO.	Description	Area	Effective Height	ACPH	Total Volume	Effective floor	Equipment Selection
		(Sqft)	(Ft)		(CFM)	(No.)	
A.	Block-B						
1	Typical corridor 1 (Second floor to Sixth floor)	946	10	12	1893	5	1 No. 2000 CFM Exhaust Fan on each floor
B.	Block-C						
1	Typical corridor 2 (Second floor to Sixth floor)	1587	10	12	3174	5	1 No. 3200 CFM Exhaust Fan on each floor
2	Typical corridor 2 (Seventh floor)	625	10	12	1250	1	1 No. 1500 CFM Exhaust Fan
3	Typical corridor 3 (Second floor to Eight floor)	753	10	12	1506	7	1 No. 1500 CFM Exhaust Fan on each floor

For [illegible]

Authorised Signatory

NAVIN [illegible]
B. Arch
C-1/2003/91873, AIIA/[illegible]

	HT PANEL ROOM			
Description	Area	Effective Height	ACPH	Total Volume
	(Sqft.)	(Ft.)		(CFM)
Ventilation Calculation @ 30 ACPH	323	12	30	1938
Equipment Selection:				
Exhaust Air :				
@ 30 ACPH	1 NO. 2000 CFM InLine Fan			
Fresh Air :				
@ 30 ACPH	Fresh Air through rolling shetter.			
	DG ROM			
Description	DG Size	CFM/kVA		Total Volume
	kVA			(CFM)
Ventilation Calculation	4000	35		140000
Equipment Selection:				
Exhaust Air :	2 NO. 60000 CFM & 1 No.31500 CFM Tube Axial Fan			
Fresh Air :	Makeup Air through Evaporative cooling			
	system :2 No. 60000 CFM Air Washer & 1			
	No. 31500 CFM Air Washer			

FOR [illegible]

Stair Case Pressurization (Block-A)

Sr. No.	Two Basement							
1	Leakage paths from pressurized staircases are							
a	Closed Door at each mid landing (Door as 2.52 Sqmt.)							
b	Open Door at terrace/FF level							
c	Open Door at ground level							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q Is in cubM/sec							
	A Is leakage area in SqM Assumed 0.002 SqM per closed door							
	P Is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	30		
	Q=	0.05034	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1M x 1.2 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.2	X	1		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF door which is always open in case of fire							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	2	Plus	2.62	x	1
	Q=	2.62068	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages:							
		Building leakage		Duct leakage				
	2.62068	+	0.393102	+	0.131		3.144816	CuM/Sec
	OR						6662.607	CFM
							7000	CFM
								@30 mm WG static pressure

ACROBAT ENGINEERS PVT. LTD.

ARAVIN KUMAR
Rich
/2003/31873, A

Stair Case Pressurization (Block-B)

Sr. No.	Two Basement + Ground							
1	Leakage paths from pressurized staircases are							
a	Closed Door at each mid landing (Door as 2.52 Sqmt.)							
b	Open Door at terrace/FF level							
c	Open Door at ground level							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	30		
	Q=	0.05034	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1M x 1.2 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.2	X	1		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid lancings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF door which is always open in case of fire							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	3	Plus	2.52	x	1
	Q=	2.67102	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages.							
		Building leakage		Duct leakage				
	2.67102	+	0.400653	+	0.1336		3.205224	CuM/Sec
			OR				6790.588	CFM
							7000	CFM
								@30 mm WG static pressure

PVT. LTD. ACROBAT ENGINEERS

NAVIN KUMAR
Arch
C-12004/918

Sr. No.	Stair Case Pressurization (Block-C)							
	Two Basement + Ground to 1st floor/Terrace							
1	Leakage paths from pressurized staircases are							
a	Closed Door at each mid landing (Door as 2.52 Sqmt.)							
b	Open Door at terrace/FF level							
c	Open Door at ground level							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is ;							
	Q=	0.839	X	0.002	X	30		
	Q=	0.05034	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1M x 1.2 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.2	X	1		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF door which is always open in case of fire							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	5	Plus	2.52	X	1
	Q=	2.7717	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages.							
		Building leakage		Duct leakage				
	2.7717	+	0.415755	+	0.1386		3.32604	CuM/Sec.
			OR				7046.548	CFM
							7000	CFM
							@30 mm WG static pressure	

ACROBAT ENGINEERS PVT. LTD.

NAVIN KUMAR
B. Arch
CA/2003/31873 ATTA/A-14545

Stair Case Pressurization (Block-B)

Sr. NO.	Two Basement + Ground to 6th floor/ Terrace
1	Leakage paths from pressurized staircases are
a	Closed Door at each mid landing (Door as 2.52 Sqmt.)
b	Open Door at terrace/FF level
c	Open Door at ground level
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)
	Q is in cubM/sec
	A is leakage area in SqM Assumed 0.002 SqM per closed door
	P is pressure required in pascal
	N is 2 for wide cracks such as doors
	Thus air leakage per closed door is

	Q=	0.839	X	0.002	X	30
	Q=	0.05034	CuM/Sec/door			

3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1M x 1.2 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.2	X	1		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF door which is always open in case of fire							

		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	10	Plus	2.52	x	1
	Q=	3.0234	CuM/Sec					

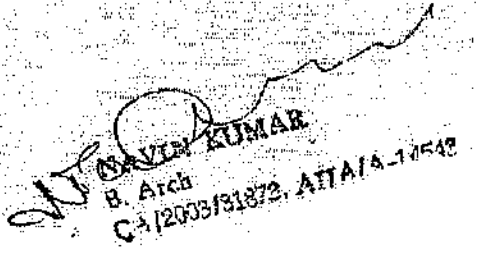
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages:							
		Building leakage		Duct leakage				
	3.0234	+	0.45351	+	0.1512		3.62808	CuM/Sec
	OR						7686.45	CFM
							8000	CFM
							@30 mm WG static pressure	

ACROGATE ENGINEERS PVT. LTD.

JAVIN KUMAR

Lift Lobby Pressurization (Block-C)

Sr. No.	Two Basement + Ground to 8th floor/ Terrace							
1	Leakage paths from pressurized Liftwell are							
a	Closed Door at each Floor (Lift Door as 3.15 Sqmt.)							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	30		
	Q=	0.05034	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1 M x 1.5 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.5	X	1		3.15	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the total mid landings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF/ Terrace Door which is always open in case of fire.							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	12	Plus	3.15	x	2
	Q=	6.90408	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages:							
		Building leakage			Duct leakage			
	6.90408	+	1.035612	+	0.345204		8.284896	CuM/Sec
	OR						17552.38	CFM
							18000	CFM
								@30 mm WG static pressure



Lift Well Pressurization (Block-C)

Sr. No.	Two Basement + Ground to 8th floor/ Terrace							
1	Leakage paths from pressurized Liftwell are							
a	Closed Door at each Floor (Lift Door as 1.68 Sqmt.)							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.6)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM. Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	50		
	Q=	0.0839	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.6M/Sec and the door size of 2.1 M x 0.8 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	0.8	X	1.5		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.0839	X	12	Plus	2.52	x	1
	Q=	3.5268	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages:							
		Building leakage		Duct leakage				
	3.5268	+	0.52902	+	0.17634		4.23216	CuM/Sec
	OR						8966.254	CFM
						Say	[illegible]	CFM
	@ 50 mm WG static pressure							

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Stair Case Pressurization (Block-C)

Sr. No.	Two Basement + Ground to 8th floor/ Terrace
1	Leakage paths from pressurized staircases are
a	Closed Door at each mid landing (Door as 2.52 Sqmt.)
b	Open Door at terrace/FF level
c	Open Door at ground level
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)
	Q is in cubM/sec
	A is leakage area in SqM Assumed 0.002 SqM per closed door
	P is pressure required in pascal
	N is 2 for wide cracks such as doors
	Thus air leakage per closed door is :

	Q=	0.839	X	0.002	X	30
	Q=	0.05034	CuM/Sec/door			

3	Air leakage through open door
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1M x 1.2 M the leakage shall be:

	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.2	X	1		2.52	CuM/Sec/door

4	Air Quantity For Pressurization
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door always open.
a	Mid landings with closed doors
b	GF door which is always open in case of fire
c	FF door which is always open in case of fire

		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	12	Plus	2.52	x	1
	Q=	3.12408	CuM/Sec					

5	Total Air Quantity For Pressurization
	Accounting for 5% duct leakage loss and 15% building leakages:

		Building leakage		Duct leakage			
	3.12400	0.468612	+	0.1562		3.748898	CuM/Sec
	OR					7942.411	CFM
						8000	CFM

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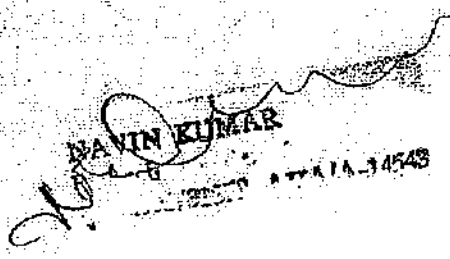
Lift Lobby Pressurization (Block-B)

Sr. NO.	Two Basement + Ground to 8th floor/ Terrace							
1	Leakage paths from pressurized Liftlobby are							
a	Closed Door at each Floor (Lift Door as 3.15 Sqmt.)							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	30		
	Q=	0.05034	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.0 M/Sec and the door size of 2.1 M x 1.5 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	1.5	X	1		3.15	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the total mid landings and the GF + 1fire floor door always open.							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
c	FF/ Terrace Door which is always open in case of fire.							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.05034	X	10	Plus	3.15	x	1
	Q=	3.6534	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 5% duct leakage loss and 15% building leakages:							
		Building leakage			Duct leakage			
	3.6534	+	0.54801	+	0.18267		4.38408	CuM/Sec
	OR						9288.112	CFM
							9500	CFM
							@30 mm WG static pressure	



Lift Well Pressurization (Block-B)

Sr. NO.	Two Basement + Ground to 6th floor/ Terrace							
1	Leakage paths from pressurized Liftwell are							
a	Closed Door at each Floor (Lift Door as 1.68 Sqmt.)							
2	Air leakage through closed door (As Per ASHRE Application 2011 Chapter 53.5)							
	Q (Air leakage) = 0.839 x A x P (Raise to power 1/n)							
	Q is in cubM/sec							
	A is leakage area in SqM Assumed 0.002 SqM per closed door							
	P is pressure required in pascal							
	N is 2 for wide cracks such as doors							
	Thus air leakage per closed door is :							
	Q=	0.839	X	0.002	X	50		
	Q=	0.0839	CuM/Sec/door					
3	Air leakage through open door							
	Assuming an e- gress velocity as 1.5M/Sec and the door size of 2.1 M x 0.8 M the leakage shall be:							
	Door ht		Door W		Egress Velocity		Air leakage	
	2.1	X	0.8	X	1.5		2.52	CuM/Sec/door
4	Air Quantity For Pressurization							
	Thus total pressurization air quantity incorporating the Total mid landings and the GF + 1fire floor door							
a	Mid landings with closed doors							
b	GF door which is always open in case of fire							
		Air leakage per closed door		No of Closed Doors		Air leakage per open door		No of Open Doors
	Q=	0.0839	X	10	Plus	2.52	x	1
	Q=	3.359	CuM/Sec					
5	Total Air Quantity For Pressurization							
	Accounting for 6% duct leakage loss and 15% building leakages:							
		Building leakage		Duct leakage				
	3.359	+	0.50385	+	0.18795		4.0308	CuM/Sec
	OR						8539.653	CFM
						Say	8500	CFM
							@ 50 mm WG static pressure	

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